

BIOLOGICAL ASSESSMENT
for
Activities Related to

**Restoration of Dry Forest Communities on the South Zone
of the Cherokee National Forest**



**USDA-Forest Service
Cherokee National Forest**

**Prepared by
Mary Miller, Forest Wildlife Biologist
Mark Pistrang, Forest Botanist/Ecologist
Matt Grove, Forest Aquatics Biologist
2800 Ocoee Street North
Cleveland, TN 37312
423-476-9756**

May 3, 2019

TABLE OF CONTENTS

TABLE OF CONTENTS	1
1.0 INTRODUCTION	1
1.1 PROJECT AREA, SCOPE OF ANALYSIS AND ENVIRONMENTAL BASELINE.....	1
1.2 PROPOSED ACTION	3
1.3 DESIGN ELEMENTS TO BE EMPLOYED	4
2.0 CONSULTATION HISTORY	7
3.0 SPECIES EVALUATED AND METHODS USED	7
4.0 HABITAT RELATIONSHIPS, EFFECTS ANALYSIS, AND DETERMINATIONS OF EFFECTS	10
4.1 GRAY BAT	10
4.2 NORTHERN LONG-EARED BAT	10
4.3 INDIANA BAT	11
4.4 BLUE SHINER	14
4.5 SPOTFIN CHUB.....	15
4.6 CITICO DARTER.....	15
4.7 TRISPOT DARTER.....	16
4.8 SMOKY MADTOM.....	16
4.9 YELLOWFIN MADTOM	17
4.10 CONASAUGA LOGPERCH	17
4.11 SNAIL DARTER.....	18
4.12 TAN RIFFLESHELL	18
4.13 UPLAND COMBSHELL.....	19
4.14 SOUTHERN ACORNSHELL	19
4.15 FINE-LINED POCKETBOOK	19
4.16 ALABAMA MOCCASINSHELL.....	20
4.17 COOSA MOCCASINSHELL	20
4.18 SOUTHERN CLUBSHELL	20
4.19 SOUTHERN PIGTOE	21
4.20 GEORGIA PIGTOE	21
4.21 OVATE CLUBSHELL.....	21
4.22 SLABSIDE PEARLYMUSSEL	22
4.23 TRIANGULAR (RAYED) KIDNEYSHELL.....	22
4.24 FLUTED KIDNEYSHELL.....	23
4.25 CUMBERLAND BEAN PEARLYMUSSEL.....	23
4.26 SMALL WHORLED POGONIA	25
5.0 SUMMARY OF EFFECTS DETERMINATIONS	27
6.0 SIGNATURE(S) OF PREPARER(S)	28

7.0 DATA SOURCES AND REFERENCES	29
ATTACHMENT A	1
ATTACHMENT B	4

1.0 INTRODUCTION

The purpose of this biological assessment (BA) is to document any potential effects of the proposed action on Proposed, Endangered, and Threatened (PET) species or their habitat, and to ensure land management decisions are made with the benefit of such knowledge. The objectives of this assessment are to:

- 1) Ensure Forest Service actions do not contribute to a loss of viability of any plant or animal species.
- 2) Comply with the requirements of the Endangered Species Act that actions by Federal agencies not jeopardize or adversely modify critical habitat of Federally listed species.
- 3) Provide a process and a standard by which PET species receive full consideration in the decision-making process.

These objectives are in compliance with direction given in Forest Service Manual 2670 (USDA FS 2005).

1.1 PROJECT AREA, SCOPE OF ANALYSIS AND ENVIRONMENTAL BASELINE

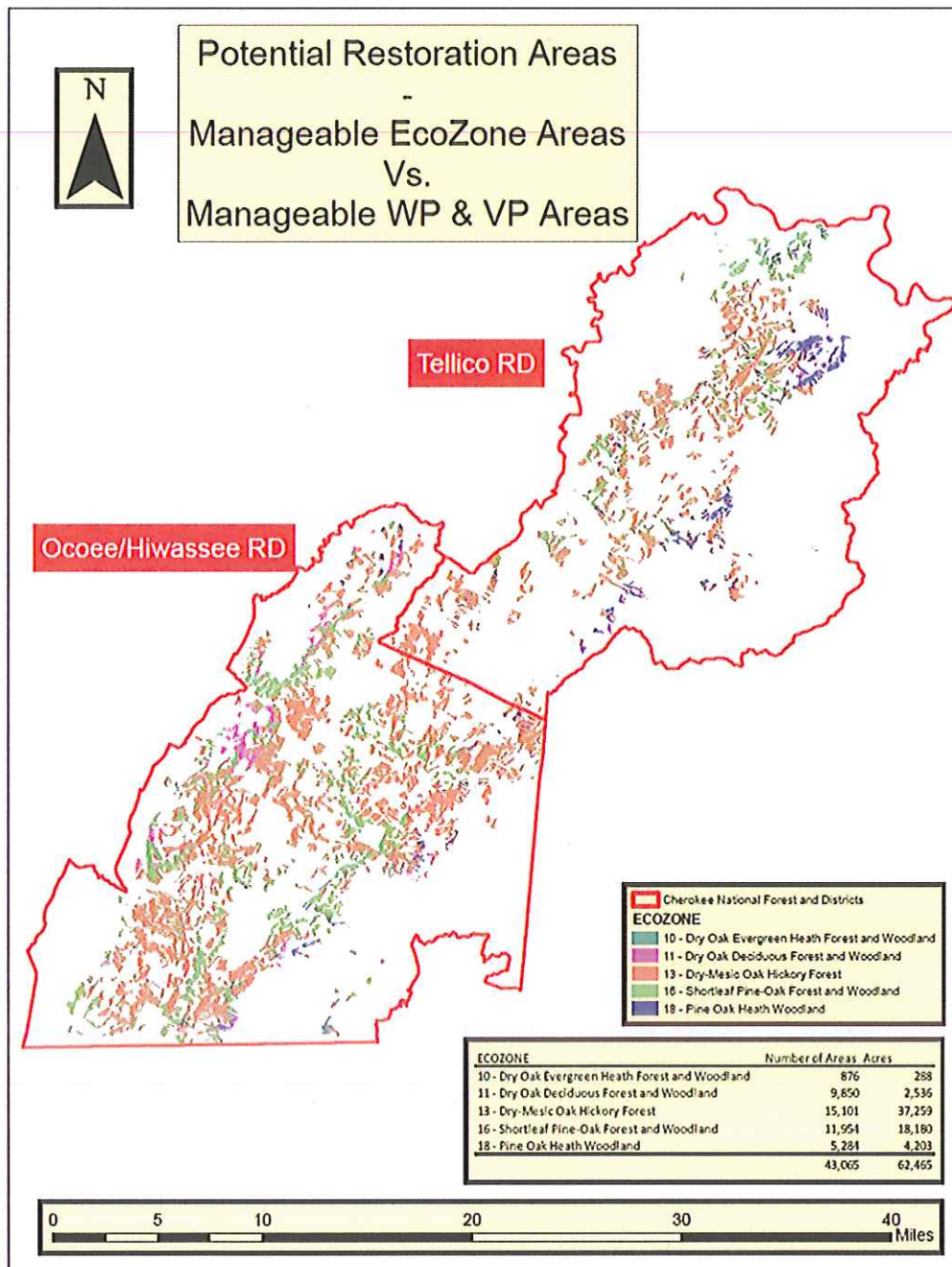
The action area (Figure 1) for available habitat, direct effects, and indirect effects on PET Species includes four broadly defined dry forest communities that include Shortleaf Pine-Oak Forest, Pine-Oak Heath Woodland, Dry-Mesic Oak-Hickory Forest, and Dry Oak-Heath Forest and Woodland across the southern districts of the Cherokee National Forest. At least 62,000 acres of these communities (within the 300,000 acre project area) have been modeled on the southern districts and represent a large area where potential landscape scale restoration could occur. Within these communities, the species that require the most management includes white pine (*Pinus strobus*) and Virginia pine (*Pinus virginiana*).

Unless otherwise described in the sections below, analysis of direct and indirect effects for resources is primarily focused within the boundaries of the stands being treated and roads. The timeframe for short-term effects is within the first year after treatment, and long-term effects up to 10-15 years from treatment. Analysis of cumulative effects also includes past, present and reasonably foreseeable activities on the forest, and may extend beyond the limits of the defined project areas to include the range of a species or habitat type. Time frames for cumulative effects analysis for terrestrial elements generally include 10 years prior to treatment and 10-15 years post treatment.

No surveys were conducted specifically for this project. Existing data on locations of rare or uncommon species was overlaid with maps of all of the potential treatment areas to see what known sites for species may be coincident or proximal.

Additional surveys and analysis will be completed when site specific stands and roads are proposed for action.

Figure 1. Goal 17 Project Area Map



The environmental baseline provides context for the impacts of the proposed action with regard to past, present, and reasonably foreseeable Federal, state, and private actions within the analysis area that may be currently affecting listed species.

Cumulative effects analysis is based on the activities in Table 1 in addition to the proposed action.

Table 1. Cumulative effects activities

Baseline, Past, Present and Reasonably Foreseeable
Vegetation management creating early successional habitat and midstory treatments
Hemlock mortality and hemlock wooly adelgid treatments
Southern pine beetle mortality
Recreational uses: dispersed camping, trail hiking, biking and horseback riding
Private land activities: land clearing and other veg modification
Vegetation management on utility rights-of-way
Vegetation maintenance in permanent openings
Prescribed burns appx 10,000 acre per year
Wild fire and suppression activities
Non-native invasive plant growth and treatments
Non-native invasive hog disturbance
Road Maintenance/Construction
Illegal OHV use

1.2 PROPOSED ACTION

This project proposes to:

- Utilize a suite of silvicultural activities including both commercial and non-commercial vegetation treatments and site preparation for natural vegetation regeneration and planting.
- Utilize prescribed fire to create and maintain desired conditions and the use of fire to enhance the success of regeneration on sites that require planting. Fire would be used at its ecologically appropriate intensity, duration, frequency and spatial extent. Containment lines would be preferentially determined using existing roads, streams, and other natural and man-made features to minimize additional ground disturbance (bulldozer lines).
- Utilize herbicides for restoration purposes that are for a targeted species and are applied in a targeted manner. A suite of herbicides would be used to prepare or manage a site that has been treated to remove “offsite pine species” and promote desirable native species composition.
All herbicides and surfactants would be used in accordance with label requirements and Forest Plan standards. Chemical treatments could include streamline basal bark, hack and squirt, cut stem surface, or foliar spray methodologies. Active ingredients that been approved for Forest Service use include but are not limited to glyphosate, triclopyr, and imazapyr.
- To provide adequate access to treatments, conduct reconstruction on national forest system roads. Temporary roads would be constructed as necessary.

1.3 DESIGN ELEMENTS TO BE EMPLOYED

Proposed management actions would be conducted in accordance with the Revised Land and Resource Management Plan (RLRMP) (USDA FS 2004a) and the Final Environmental Impact Statement for the Revised Land and Resource Management Plan (FEIS) (USDA FS 2004b). In addition, the following would apply:

Forest Plan standards and soil and water best management practices (Forest Service and Tennessee Division of Forestry) would be required and their use has been a key assumption used in the environmental analysis. In addition to these standard requirements, the following design elements would apply in the dry forest cover type:

In general, the use of herbicides not listed above would trigger additional analysis.

Threatened and Endangered Aquatic Species

To ensure that habitat for threatened and endangered aquatic species is adequately protected the streamside management zone will be extended to 300 feet on either side for all critical habitat and occupied habitat. Additionally tributaries that feed into critical/occupied habitat will also be buffered by 300 feet on either side extending from the confluence of the affected habitat, upstream one half mile.

This extended buffer would result in an approximately 1.03% reduction from the available suitable acres originally proposed (Table 2).

Table 2. Aquatic T&E extended buffer zone. A no management buffer would be extended to 300 feet on either side of critical habitat, occupied habitat and ½ mile of contributing tributaries to protect threatened and endangered species.

Buffer Length	Acres	Percent of Total
300 feet	641.4	1.03%

Below is a list of the activities that would be restricted in the aquatic T&E extended buffer zone:

- Road Construction
- Mechanical vegetation treatments
- Skid trails
- Log landings
- Bladed or hand firelines
- Prescribed fire
- Soil-active herbicides or herbicide application

If site specific plans call for the use of any of the above listed activities, additional analysis would be required.

The remaining stream habitat that exists in the project area would be protected by CNF Forest Plan standards. These systems are protected by either the streamside filter zone (standard FW-3)

or by Prescription 11 - the riparian corridor (standard RX11-13, RX11-15, and RX11-14), whichever is greater. Table 3 summarizes Forest Plan standards for streamside/ riparian protection.

Table 3. Streamside filter zone and riparian corridor guidance. Distance width in feet between major disturbance and perennial, intermittent, streams, lakes and other waterbodies. The streamside filter zone applied to both intermittent and perennial streams, lakes and other waterbodies.

Streamside Filter Zone

Slope %	0	10	20	30	40*	50*	60*
Width (Feet)	40	75	102	146	183	224	274

* The proposed action limits ground based mechanical treatments to slopes less than or equal to 35%.

Riparian Corridor

Perennial	Intermittent
100 feet	50 feet

New Temporary Roads

This analysis is being written assuming that new temporary roads would not cross perennial, intermittent or ephemeral stream channels.

Threatened and Endangered Bat Species

Below are maximum annual acreages from the Biological Opinion for Activities Affecting Indiana Bats on Southern Districts of the Cherokee National Forest (Indiana Bat BO) (USDI Fish and Wildlife Service 2015a). These acreages are for the period between April 1 and September 30 (except for burning which is April 15-August 15) only. For purposes of this analysis, it is assumed these acreages will not deviate.

Table 4. Maximum annual acreages for activities affecting bats.

Timber Harvest		Acres 4/1 to 9/30
	Regeneration Harvest	800
	Thinning (including non-commercial)	500
	Group selection	250
	Total	1550
Prescribed Burning April 15-August 15 only		
	Prescribed Burning	3000

Construction and Reconstruction of Roads	
Tree removal	4
Grand Total	4554

Terms and Conditions from the Indiana Bat BO will be followed including

- The CNF will annually determine the total number of acres that have been subjected to project implementation activities during the Indiana bat's annual occurrence period (April 1 to September 30). This information will be included in annual reports over the 5-year period of the action or until the activities included under this action have been completed.
- If possible, timber sales will require that harvest area boundaries be irregular in configuration, with clumps of trees left within harvest areas and irregular strips of trees extending into harvest areas to maintain forested travel corridors between the harvest areas and surrounding areas.

Terms and Conditions from the Biological Opinion Activities Affecting the Northern Long-Eared Bat on Southern Region National Forests (NLEB BO) (USDI Fish and Wildlife Service 2015b) will be followed including

- Identify NLEB hibernacula and roosts. In coordination with the Service Field Office of applicable jurisdiction, each Forest will maintain a database of the locations of known NLEB hibernacula and roosts on the Forest and within 0.25 mile of the Forest boundaries. The FS will update this database as new information becomes available, but at least annually, and use it to identify projects that require further consultation under RPM1 or that may document compliance with ESA section 7(a)(2) under RPM2.

In addition, activities

- will not occur more than 0.25 mile (0.4 kilometer) from a known Northern long-eared bat hibernacula
- will avoid cutting or destroying known, occupied maternity Northern long-eared bat roost trees during the pup season
- will avoid clearcuts and similar harvest methods within 0.25 mile of known, occupied Northern long-eared bat maternity roost trees during the pup season.
- that do not meet this criteria will trigger additional consultation.

Soil Protection:

Ground based mechanical treatments on slopes equal to or less than 35% will be covered by this programmatic analysis. Operations on slopes greater than 35% should be considered a special circumstance and will require additional, site specific analysis.

Roads:

Only the following road impacts would be addressed by this programmatic analysis. Road needs beyond what is described here should be considered a special circumstance and will require additional, site specific analysis.

Temporary roads

- Temporary roads would be limited to 1/2 mile each for each unit. After use, all temp roads would be managed following forest plan standards and state BMP's. (The road prism would likely remain on the landscape until such a time as site specific analysis suggests otherwise)
- Any temporary road constructed in an area identified in the Mountain Treasures book (Irwin 1996) beyond ¼ mile would be re-contoured. These areas are not given any special designation in the Forest Plan.
- Skid trails and temporary roads for the purpose of timber harvest would not be constructed for sustained distances over 200 feet in areas with slopes of 40% or greater ("steep area").
- The 200-foot length can be exceeded however where the skid trail and/or temporary road is needed to traverse a steep area in order to access the remaining harvest unit(s).
- Reconstruction of National Forest system roads would be allowed unless it changes the road management objective.
- Roads outside the four broadly defined dry forest communities that include Shortleaf Pine-Oak Forest, Pine-Oak Heath Woodland, Dry-Mesic Oak-Hickory Forest, and Dry Oak-Heath Forest and Woodland would need site specific analysis for PET species.

2.0 CONSULTATION HISTORY

Informal consultation/conferencing between the Forest Service, Cherokee National Forest and the Fish and Wildlife Service, Cookeville, Tennessee began in August 2017 with the formation of the South Zone Collaborative Team including Mark Pistrang (USFS) and Geoff Call (USFWS). In March 2019, Mary Miller (USFS) notified Lee Andrews (USFWS) regarding the project. Further conferencing occurred in March and April 2019 between Sarah Harrison (USFWS) and Ms. Miller as well as with Matt Grove (USFS).

3.0 SPECIES EVALUATED AND METHODS USED

Analysis of the project was conducted using best available science. Using information from project area habitat conditions, species habitat requirements, and species distributions and limiting factors, the 2018 Cherokee National Forest PET list was reviewed to determine if any PET species were likely to occur in or near the project area. Element Occurrence Record Database Maps that include Tennessee Natural Heritage and Cherokee National Forest data (2018) were examined to locate any records of PET species currently in the project area.

Attachment A lists the CNF PET species. *Attachment B* lists the Project Review Codes (PRC) used to determine whether further analysis is needed. The status of each species within the CNF and within the project area is based on known surveys, literature review, and information as cited.

- For species with PRC of 1a, the project is located out of the species known range, or suitable habitat does not exist in the project area. The project is expected to have no effects on PET species. No further analysis will be done for these species. Species with

no occurrences or habitat in the action area with a no effect determination are listed in Table 5.

- For those species coded 2a, all requisite habitats have been identified and excluded from disturbance associated with the project and therefore the project is expected to have no effects on PET species regardless of the number and location of individuals in the area affected by the project. Additional design elements have been established to eliminate effects and remove habitat from the action area. Since the proposed action is programmatic in nature and does not describe site specific management activities and critical habitat and species are present, a detailed analysis is provided for those species present in the action area. A list of those species is provided in Table 6.
- For those species coded 7a, a site specific inventory was conducted, but the species was not found in the project area. Based upon this, the project is expected to have no effects on PET species. No further analysis will be done for these species.

Any species given one of the remaining codes (3a, 4a, 5a, 6a, 7b) or species present in the action area will be further evaluated in this BA (Table 6).

Table 5 Species with no occurrences or habitat in the project area with a no effect determination

Group	Scientific Name	Common Name	Status	Habitat in Project Area	Determination of Effect
Arachnid	<i>Microhexura montivaga</i>	Spruce-fir moss spider	E	None	No Effect
Fish	<i>Percina antesella</i>	Amber darter	E	None	No Effect
Lichen	<i>Gymmoderma lineare</i>	Rock gnome lichen	E	None	No Effect
Mammal	<i>Corynorhinus townsendii virginianus</i>	Virginia big-eared bat	E	None	No Effect
Mammal	<i>Glaucomys sabrinus coloratus</i>	Carolina northern flying squirrel	E	None	No Effect
Mussel	<i>Alasmidonta raveneliana</i>	Appalachian clktoc	E	None	No Effect
Mussel	<i>Epioblasma capsaeformis</i>	Oyster mussel	E	None	No Effect
Reptile	<i>Glyptemys muhlenbergii</i>	Bog turtle	T	None	No Effect
Vascular Plant	<i>Geum radiatum</i>	Spreading avens	E	None	No Effect
Vascular Plant	<i>Hedyotis purpurea var. montana</i>	Roan Mountain bluet	E	None	No Effect
Vascular Plant	<i>Pityopsis ruthii</i>	Ruth's golden aster	E	None	No Effect
Vascular Plant	<i>Platanthera integrilabia</i>	White fringeless orchid	T	None	No Effect
Vascular Plant	<i>Solidago spithamea</i>	Blue Ridge goldenrod	T	None	No Effect
Vascular Plant	<i>Spiraea virginiana</i>	Virginia spiraea	T	None	No Effect

The following CNF PET species are either known to occur in the project area or have suitable habitat present in the project area and therefore will be analyzed in this Biological Assessment.

Table 6 PET species of the CNF analyzed in this assessment for activities

Group	Scientific Name	Common Name	Presence	Status
Mammal	<i>Myotis grisescens</i>	Gray bat	Habitat Present	E
Mammal	<i>Myotis septentrionalis</i>	Northern long-eared bat	Habitat Present	T
Mammal	<i>Myotis sodalis</i>	Indiana bat	Habitat Present	E
Fish	<i>Cyprinella caerulea</i>	Blue shiner	Habitat Present / Known to Occur	T
Fish	<i>Erimonax monachus</i>	Spotfin chub	Habitat Present / Known to Occur	T
Fish	<i>Etheostoma sitikuense</i>	Citico darter	Habitat Present / Known to Occur	E
Fish	<i>Etheostoma trisella</i>	Trispot Darter	Habitat Present	T
Fish	<i>Noturus baileyi</i>	Smoky madtom	Habitat Present / Known to Occur	E
Fish	<i>Noturus flavipinnis</i>	Yellowfin madtom	Habitat Present / Known to Occur	T
Fish	<i>Percina jenkinsi</i>	Conasauga logperch	Habitat Present / Known to Occur	E
Fish	<i>Percina tanasi</i>	Snail darter	Habitat Present / Known to Occur	T
Mussel	<i>Epioblasma florentina walkeri</i>	Tan (golden) riffleshell	Habitat Present / Known to Occur	E
Mussel	<i>Epioblasma metastrata</i>	Upland combshell	Habitat Present	E
Mussel	<i>Epioblasma othcaloogensis</i>	Southern acornshell	Habitat Present	E
Mussel	<i>Hamiota altilis</i>	Fine-lined pocketbook	Habitat Present / Known to Occur	T
Mussel	<i>Medionidus acutissimus</i>	Alabama moccasinshell	Habitat Present	T
Mussel	<i>Medionidus parvulus</i>	Coosa moccasinshell	Habitat Present	E
Mussel	<i>Pleurobema decisum</i>	Southern clubshell	Habitat Present	E
Mussel	<i>Pleurobema georgianum</i>	Southern pigtoe	Habitat Present / Known to Occur	E
Mussel	<i>Pleurobema hanleyianum</i>	Georgia pigtoe	Habitat Present / Known to Occur	E
Mussel	<i>Pleurobema perovatum</i>	Ovate clubshell	Habitat Present	E
Mussel	<i>Pleuonaia dolabelloides</i>	Slabside pearlymussel	Habitat Present / Known to Occur	E
Mussel	<i>Ptychobranhus foremanianus (foramianus)</i>	Triangular (Rayed) kidneyshell	Habitat Present / Known to Occur	E

Mussel	<i>Ptychobranchus subtentum</i>	Fluted kidneyshell	Habitat Present	E
Mussel	<i>Villosa trabalis</i>	Cumberland bean pearlymussel	Habitat Present / Known to Occur	E
Vascular Plant	<i>Isotria medeoloides</i>	Small whorled pogonia	Habitat Present	T

4.0 HABITAT RELATIONSHIPS, EFFECTS ANALYSIS, AND DETERMINATIONS OF EFFECTS

4.1 GRAY BAT

Habitat Relationships

The gray bat (*Myotis grisescens*) is a federally listed endangered species that is found throughout the limestone region of southern middle-western and southeastern United States (Whitaker 1998). It has been documented at 11 locations on the CNF, most of which on the northern districts of the CNF. Gray bats primarily use caves year-round for hibernating, maternity colonies, and roosting. They forage for insects over water along riparian areas and shorelines with forest cover (USFWS 1982). They feed primarily on flying insects such as mayflies, moths, flies, and beetles parallel to streams and generally within ten feet of the water surface (LaVal 1977).

Gray bats are threatened by the destruction of hibernacula (USFWS 1982) and white nose syndrome, a fungus that attacks hibernating bats. White nose syndrome has been found in Tennessee and large-scale population declines may occur in the future as the disease continues to spread.

Environmental Baseline

Foraging habitat for gray bat may be present within or adjacent to the action areas along riparian areas.

Direct, Indirect and Cumulative Effects

Given that the use of the project area by gray bats is for foraging in and along waterways and the use of the RLRMP standards and guides along with the additional riparian buffers, there will be no effects to gray bats with the activities.

Determination of Effect:

The proposed project has a “no effect” determination for gray bats.

4.2 NORTHERN LONG-EARED BAT

Habitat Relationships

The Northern long-eared bat (*Myotis septentrionalis*) (NLEB) is found throughout the eastern United States and Canada (USFWS 2013). This bat uses caves and man-made structures for

hibernation. The nearest known hibernaculum is located in the Great Smoky Mountains National Park. They leave their hibernacula March-May and return August-November (USFWS 2014).

In summer, bats roost singly or in small colonies, mainly in trees but occasionally in caves. NLEB typically use large, tall trees (either live or dead) and roost under loose bark or in cavities or crevices. NLEB are somewhat opportunistic when selecting roost trees, not depending on a particular tree species. Structural complexity of roosting habitat may be more important. Forest canopy cover has been found to range from 56 to 84%, with some studies finding roosts in stands with lower canopy cover than the surrounding forest, particularly females (USFWS 2013). NLEB has also been occasionally found roosting in structures like barns and sheds. Males and non-reproductive females may also roost in cooler places, like caves and mines (USFWS 2014).

A study on the northern districts of the Cherokee National Forest suggests northern long-eared bats are more likely to occupy sites at lower elevations and that are less rugged. Survey sites with a high probability of occupancy (>0.90) were in forests ranging from 26–120 years in age (mean = 80 years). Northern long-eared bat occupancy rates were higher in stands with a mix of hardwoods and pines—mainly oaks, hickory, yellow poplar, and white pine. Northern long-eared bats appear to be tolerant of both timber harvest and prescribed fire (Rojas et al 2018).

NLEB forage for insects by hawking and gleaning on forested ridges and hillsides. Gleaning behavior suggests that these bats have the ability to maneuver and forage in a cluttered environment (USFWS 2013).

The single greatest threat to NLEB is white nose syndrome, a disease caused by a fungus that attacks hibernating bats (USFWS 2013). Large-scale population declines may occur in the future as the disease continues to spread.

Environmental Baseline

On the Cherokee National Forest, this bat has been documented in every county. Mist net and ANABAT surveys have been conducted on the Cherokee National Forest since 1998, with over 1,100 net nights and 1,000 NLEB captures.

Direct, Indirect and Cumulative Effects

As effects to Northern long-eared bats are similar to other bat species, these will be analyzed together below.

4.3 INDIANA BAT

Habitat Relationships

The Indiana bat (*Myotis sodalis*) occurs from Iowa, south to Oklahoma and Alabama, west to South Carolina and north to New Hampshire. Caves are used for hibernacula. Over 90% of the population hibernated in five states (IN, MO, KY, IL, NY) in 2005. No hibernacula are known from the Cherokee National Forest (CNF), but one is located in the Great Smoky Mountains National Park. Four additional hibernacula are located within 40-70 miles of the Cherokee National Forest (USFWS 2007). This bat has been documented through mist netting in Monroe County on the Cherokee National Forest during the summer months.

A variety of trees are used by Indiana bats for roosts, including both conifers and hardwoods with exfoliating bark. Many maternity colonies have been associated with oak-hickory and elm-

ash-cottonwood forest types. A landscape-scale study in the Southern Appalachians found that optimal Indiana bat summer roosting habitat occurred near ridgetops in a south-facing, mixed pine forest at elevations ranging from about 800 to 2,300 feet (Rojas et al. 2018). Roost tree structure is probably more important than the tree species in determining whether a tree is a suitable roost site; and tree species which develop loose, exfoliating bark as they age and die are likely to provide roost sites.

Indiana bat roosts are transient and frequently associated with dead or dying trees. Roost longevity is variable due to many factors such as the bark sloughing off or the tree falling down. Some roosts may only be habitable for one to two years (O'Keefe personal communication 2012). In the Southern Appalachians, heavily decayed yellow pines (*Pinus* spp.) were the most abundant type of snag on the landscape post Southern Pine Beetle outbreak, although most yellow pine snags quickly became too decayed to provide suitable roosts for Indiana bats (O'Keefe personal communication 2012).

A variety of suitable roosts are needed within a colony's traditional summer range for the colony to continue to exist. Indiana bat maternity sites generally consist of one or more primary maternity roost trees, which are used repeatedly by large numbers of bats, and varying numbers of alternate roosts, which may be used less frequently and by smaller numbers of bats. Primary roosts are often located in openings or at the edge of forests, while alternate roosts can be in either openings or the interior of forests. Primary roosts are usually surrounded by open canopy and are warmed by solar radiation. Alternate roosts may be used when temperatures are above normal or when it rains. Shagbark hickories provide good alternate roosts because they are cooler during periods of high heat and their tight bark shields bats from precipitation (U.S. Fish and Wildlife Service 2007). Bats move among roosts within a season and when a particular roost becomes unavailable from one year to the next. It is not known how many alternate roosts must be available to assure retention of a colony within a particular area, but large, nearby forest tracts improve the potential for an area to provide adequate roosting habitat (Callahan 1993; Callahan et al. 1997).

Many male Indiana bats appear to remain at or near the hibernacula in summer with some fanning out in a broad band around the hibernacula (Whitaker and Brack 2002). Males roost singly or in small groups in two to five roost trees, similar to those used by females. Males may occasionally roost in caves during summer. Suitable roost trees typically have a large diameter, exfoliating bark and prolonged solar exposure, with no apparent importance in regard to the tree species or whether it is upland or bottomland (Whitaker and Brack 2002). However, because males typically roost individually or in small groups, the average size of their roost trees tends to be smaller than the roost trees used by female maternity colonies; males have been observed roosting in trees as small as 2.5 in DBH (Gumbert et al. 2002; U.S. Fish and Wildlife Service 2007). Males have shown summer site fidelity and have been recaptured in the same foraging areas as they had used in prior years (U.S. Fish and Wildlife Service 2007).

Weather has a profound influence on bat behavior and habitat use (Humphrey et al. 1977). Exposure of trees to sunlight and location relative to other trees are important to suitability for roosting. Cool temperatures can delay development of fetal and juvenile young and selection of appropriate maternity roost sites may be critical to reproductive success. Dead trees with southeast and south-southwest exposures allow warming solar radiation. Some living trees may provide a thermal advantage during cold periods (U.S. Fish and Wildlife Service 2007). Therefore, maternity colonies use multiple roosts in groups that contain both living and dead

trees. Extent and configuration of a use area is probably determined by availability of suitable roost sites. Distances between roosts can be a few yards to a few miles. Maternity colony movements among multiple roosts seem to depend on climatic changes, particularly solar radiation (Humphrey et al. 1977). Movement between roosts may be the bats' way of dealing with a roost site being temporary because of loose bark (which eventually breaks loose from the tree). Presumably, bats that are aware of alternate roost sites are more likely to survive sudden, unpredictable destruction of their roosts, than bats that have not identified alternative sites.

Indiana bats are threatened by white nose syndrome, a disease caused by a fungus that attacks hibernating bats (USFWS 2013). Large-scale population declines are expected over the next several years as the disease continues to spread.

Environmental Baseline

Suitable maternity and roosting habitat occurs within the possible dry forest areas though Indiana bats have only been documented through mist netting in Monroe County Tennessee (CNF 2018).

Direct and Indirect Effects

Silvicultural activities including both commercial and non-commercial vegetation treatments and site preparation for natural vegetation regeneration and planting, are designed to have a long-term beneficial effect on the overall composition and structure of dry forest communities, which should improve habitat for the bat species that may occur in the long-term. Ground disturbing effects from the implementation of some of these activities could impact individuals in the short-term however. The use of mechanized equipment, felling of trees, construction of temporary roads, and creation of skid trails, all have the potential to directly impact individual bats. Increases in sunlight to snags and other possible roost trees would be beneficial to bats for a period of a few years until surrounding vegetation shades them again. The reduction of understory would increase a bats ability to navigate through the forest increasing the possibility of use for foraging. Because such impacts are site specific and this proposal does not evaluate any site specific actions, no direct effects can be attributed here. Therefore, site specific analysis would occur prior to the implementation of future site specific activities.

Prescribed burning and herbicide treatments would possibly decrease understory and have a similar affect as timber harvest. Burning could also decrease snags if they are at a decadent stage, otherwise snags could be created.

Cumulative Effects

Past timber harvests, combined with silvicultural, wildlife, and prescribed burning activities would be expected to improve bat habitat over time by creating more open space for foraging and the creation of new snags for roosting. These activities in combination with the proposed action would not create cumulative effects for bats. No known state or private activities are reasonably certain to occur within the action area that would affect bats. Therefore, no cumulative effects to bats are expected.

Determination of Effect Northern Long-eared Bat:

This project is likely to adversely affect the Northern long-eared bat; however, there are no effects beyond those previously disclosed in the programmatic biological opinion dated August

5, 2015 (FWS Log #04E00000-2015-F-0003). Any taking that may occur incidental to this project is excepted from the prohibitions for taking threatened species under 50 CFR 17.31 and 17.32. This project is consistent with the Forest Plan, the description of the proposed action in the programmatic Biological Opinion, and activities excepted from taking prohibitions under the ESA section 4(d) rule applicable to the Northern long-eared bat; therefore, the programmatic Biological Opinion satisfies the Forest Service's responsibilities under ESA section 7(a)(2) relative to the Northern long-eared bat for this project.

Given the lack of site specific stands and roads in this project proposal, the determination of effect is subject to change based on further review of that information when it is available.

Determination of Effect Indiana Bat:

The effects to the proposed project activities are likely to adversely affect the Indiana bat. However, the activities connected with this project are consistent with the Forest Plan and with those described by previous formal consultations (USDA 2014, FWS #2014-F-0387 Section 7 Consultation for Activities Affecting Indiana Bats on the Southern Districts of the Cherokee National Forest). As a result of those previous consultations, the Fish and Wildlife Service issued a non-jeopardy Biological Opinion (FWS 2015) establishing annual incidental take authorizations. This project tiers to that Biological Opinion and no additional formal consultation is required.

The Biological Opinion (FWS 2015) will expire in 2019 and will be reviewed by the Forest Service and the Fish and Wildlife Service. Given the lack of site specific stands and roads in this project proposal, the determination of effect is subject to change based that information and on future consultations.

4.4 BLUE SHINER

Habitat Relationships

The blue shiner (*Cyprinella caerulea*) is endemic to the upper Mobile Basin drainage ranging from Tennessee down to central Alabama. Habitat includes small streams to large rivers with low gradients at low elevation; firm substrates in pools and areas of moderate current. Feeding is surface or mid water column where terrestrial and immature aquatic insects are taken. Spawning is from spring into summer.

Threats include water quality degradation associated with urbanization, sewage pollution, and strip mining; introduced biota; and impoundments.

Environmental Baseline

On the Cherokee NF, it occurs only in the Conasauga River watershed where it is known from the Conasauga River, Jack's River, Sawmill Branch and Mooneyham Branch.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.5 SPOTFIN CHUB

Habitat Relationships

The spotfin chub (*Erimonax monachus*) inhabits cool and warm, typically clear, large creeks or medium-sized rivers of moderate gradient, in upland and montane areas, generally in or near moderate and swift currents over gravel to bedrock, rarely over sand or silt. The spotfin chub is a rock crevasse spawner; males guard cracks in bedrock in swift flows. Spotfin chubs forage on drifting insects in the water column and seek escape by moving to other swift flowing areas. They are endemic to the Tennessee River in Tennessee, Virginia, North Carolina and Georgia.

Threats include fragmentation and loss of habitat from reservoirs and siltation.

Environmental Baseline

On the Cherokee NF, it has been re-introduced into Tellico River as a non-essential experimental population. No other occurrences are likely on the Forest. Spotfin chubs were first introduced into the Tellico River in 2002. Approximately 1700 have been introduced every year since. They were found to be successfully reproducing in 2006. In 2018 it was also found using tributary habitat in Lyons Creek.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.6 CITICO DARTER

Habitat Relationships

The Citico darter (*Etheostoma sitikuense*) inhabits large streams with low gradients at low elevations. Citico darters are usually found in the transitional zone between riffles and pools. They were never observed in pool habitats even when suitable slab rocks were present. Flat rocks for spawning and hiding cover are essential. Excess sediment may be detrimental to its survival. Male Citico darters excavate nest cavities under flat rocks where they guard their eggs and young. These darters use the interstitial spaces between rocks for escape cover and for foraging on aquatic insects. Formerly known as the duskytail darter, this species is endemic to tributaries of the Little Tennessee River system.

Environmental Baseline

The Citico darter occurs naturally only in Citico Creek on the Cherokee National Forest. Two non-essential, experimental, populations have been established: one in Abrams Creek (Great Smoky Mountains National Park) and the other in the Tellico River (CNF). Citico darters were first introduced into the Tellico River in 2003. Approximately 430 have been introduced every year since. They were found to be successfully reproducing in 2004.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.7 TRISPOT DARTER

Habitat Relationships

The trispot darter (*Etheostoma trisella*) was listed as threatened in December 2018. It is native to the Coosa River system in AL, GA, and TN. It is a migratory species that used distinct breeding and nonbreeding habitats. The trispot darter inhabits non-breeding habitats between April and October in the margins of small to medium sized rivers with slower velocities. It is often associated with detritus, woody debris and stands of water willow. In the late fall the trispot darter begins to move into smaller ephemeral streams that hold water from November to April and migrations are likely stimulated by precipitation. Threats include reduced connectivity from natural features or road crossings, hydrologic alteration, channel modification, urbanization, loss of riparian vegetation, sedimentation and other contaminants that enter river systems through runoff.

Environmental Baseline

There are no records of trispot darter on the CNF. Critical habitat has been designated and extends to the mouth of Minneawauga Creek approximately 300 meters downstream from the Forest boundary in the Conasauga River.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.8 SMOKY MADTOM

Habitat Relationships

This smoky madtom (*Noturus baileyi*) inhabits large streams with low gradients at low elevations. It prefers transitional areas between pools and riffles; shallow riffles containing flat, palm sized slab rocks, pea sized gravel; and deep pools (during colder months) with silty/sandy bottoms with large boulders. Excess sediment may be detrimental to their survival. This species is nocturnal. Male madtoms excavate nest cavities under flat rocks where they guard their eggs and young. Madtoms use the interstitial spaces between rocks for escape cover and for foraging on aquatic insects. This species is endemic to the Little Tennessee River system.

Environmental Baseline

The smoky madtom occurs naturally only in Citico Creek on the Cherokee National Forest. Critical Habitat for the smoky madtom was designated at the time of listing for Citico Creek from the upper Mountain Settlement Bridge upstream to the confluence with Barkcamp Branch. Smoky madtoms have documented both above and below the Critical Habitat. Two non-essential, experimental, populations have been established: one in Abrams Creek (Great Smoky Mountains National Park) and the other in the Tellico River. Smoky madtoms were first introduced into the Tellico River in 2003. Approximately 270 have been introduced every year since. They were found to be successfully reproducing in 2005.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.9 YELLOWFIN MADTOM

Habitat Relationships

The yellowfin madtom (*Noturus flavipinnis*) inhabits large streams to large rivers with low gradients at low elevations. It occurs in pools associated with cover such as flat rocks for spawning and leaf packs for shelter (US FWS 1983). This species is nocturnal. Excess sediment may be detrimental to its survival. Male madtoms excavate nest cavities under flat rocks where they guard their eggs and young. Madtoms use the interstitial spaces between rocks for escape cover and for foraging on aquatic insects. Yellowfin madtoms are endemic to the upper Tennessee River.

Environmental Baseline

Yellowfin madtom occur on the Cherokee National Forest in 2 miles of Citico Creek, in the Powell River in northern Tennessee, and in Copper Creek in Virginia. Two non-essential, experimental, populations have been established: one in Abrams Creek (Great Smoky Mountains National Park) and the other in the Tellico River.

Yellowfin madtoms were first introduced into the Tellico River in 2003. Approximately 230 have been introduced every year since. They were found to be successfully reproducing in 2008.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.10 CONASAUGA LOGPERCH

Habitat Relationships

The Conasauga logperch (*Percina jenkinsi*) is endemic to the Conasauga River. Habitat is typically large streams with low gradients at low elevations; deep gravel runs or pools with small stones and sandy bottoms. Conasauga logperch feed on aquatic invertebrates which are obtained by flipping over stones with its snout. Spawning occurs in the spring over shallow gravel with fast current. Threats include sedimentation, channelization, and impoundment.

Environmental Baseline

On the CNF it occurs for the entire length of the Conasauga and Jacks Rivers within the Forest Boundary. Critical habitat is defined on the Cherokee NF in the Conasauga River from Halfway Branch downstream to Georgia State Hwy 2, Murray County, Georgia.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.11 SNAIL DARTER

Habitat Relationships

The snail darter (*Percina tanasi*) is endemic to larger tributaries of the Tennessee River from the Sequatchie River to the confluence of the French Broad and Holton Rivers. Historically the snail darter was present in the Little Tennessee River upstream of the confluence with Citico Creek. Seven extant populations exist. Preferred habitat is small rivers with low gradient at low elevation with sand and gravel shoals to deep pools with some current. Snail darters feed primarily on snails with some insects also taken. Spawning occurs in late winter to early spring. Eggs are deposited in gravel areas; larva drift downstream. Juveniles migrate upstream after 3 to 4 months. Threats are primarily from impoundments.

Environmental Baseline

On the Cherokee NF it occurs in the Hiwassee River from the downstream Forest boundary upstream to Reliance. A single individual was collected in Citico Creek in 2007; its origin is unknown.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.12 TAN RIFFLESHELL

Habitat Relationships

The tan riffleshell mussel (*Epioblasma florentina walkeri*) is endemic to major tributaries of the Tennessee and Cumberland Rivers. Only two extant populations remain. Preferred habitat is large streams and small rivers with low gradient at low elevation in shallow riffles (less than 3 feet deep) with coarse sand, gravel, and some silt. Fish hosts include sculpins, greenside darter, fantail darter, and redline darter. Threats are from impoundments that flood habitat or alter flow regime; siltation from strip mining, coal washing, dredging, farming, logging and road construction; and pollution from municipal, agricultural, and industrial waste discharges.

Environmental Baseline

It is known from two sites in the Hiwassee River on the Cherokee NF and the other population is in the Clinch River. The upper site, on the Hiwassee River, was augmented in 1999 with juveniles raised by Dr. Dick Neves, Va. Tech. but none of these have been seen since. The last observation of a live tan riffleshell mussel in the Hiwassee River was in 1993.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.13 UPLAND COMBSHELL

Habitat Relationships

The upland combshell (*Epioblasma metastrata*) is endemic to the Mobile River system. Preferred habitat is medium size rivers with moderate gradient in riffle areas. Fish host is unknown. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

Environmental Baseline

It has not been documented on the Cherokee NF but is known from the Conasauga River five miles below the Forest boundary. Critical Habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.14 SOUTHERN ACORNSHELL

Habitat Relationships

The southern acornshell (*Epioblasma othcaloogensis*) is endemic to the Mobile River system. Preferred habitat is medium size rivers with moderate gradient in riffle areas. Fish host is unknown. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

Environmental Baseline

It has not been documented on the Cherokee NF but is known from the Conasauga River eight miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.15 FINE-LINED POCKETBOOK

Habitat Relationships

The fine-lined pocketbook (*Hamiota altilis*) is endemic to the Alabama River system; three extant populations are known. Preferred habitat is large streams to large rivers with low gradient at low elevation; in moderate current less than 3 feet deep with a substrate composed of sand and mud with some gravel. Fish hosts include redeye and largemouth bass. Threats include habitat modification, impoundments, sedimentation, eutrophication, urban and agricultural runoff, and sand and gravel mining.

Environmental Baseline

The fine-lined pocketbook has been documented in the Conasauga River within the Forest Boundary. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.16 ALABAMA MOCCASINSHELL

Habitat Relationships

The Alabama moccasinshell (*Medionidus acutissimus*) is endemic to the Mobile River system. The preferred habitat is on the margins of streams with a sand and gravel substrate in clear water of moderate flow in small to large rivers. Fish hosts include several darters and a topminnow. Threats include habitat modification, sedimentation, and water quality degradation.

Environmental Baseline

The Alabama moccasinshell has not been documented on the Cherokee NF but is known from the Conasauga River four miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.17 COOSA MOCCASINSHELL

Habitat Relationships

The Coosa moccasinshell (*Medionidus parvulus*) is endemic to the Mobile River system. Preferred habitat is usually sand and gravel in highly oxygenated, clear streams with moderate to strong flows in streams and small rivers. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

Environmental Baseline

The Coosa moccasinshell has not been documented on the Cherokee NF but the only extant population is in the Conasauga River where it has been found five miles downstream of the Forest Boundary. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.18 SOUTHERN CLUBSHELL

Habitat Relationships

The southern clubshell (*Pleurobema decisum*) was known from Mississippi, Alabama, Georgia and Tennessee. The preferred habitat is highly oxygenated streams with sand and gravel substrate in shoals of large rivers to small streams; it may be found in sand and gravel in the center of the stream or in sand along the margins of the stream. Threats include habitat modification, sedimentation, and water quality degradation.

Environmental Baseline

The southern clubshell has not been documented on the Cherokee NF but is known from the Conasauga River five miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.19 SOUTHERN PIGTOE

Habitat Relationships

The southern pigtoe (*Pleurobema georgianum*) is endemic to the Alabama River system with four extant populations. Preferred habitat is large streams with low gradient at low elevation; sand, gravel, and cobble shoals and runs. Fish host is unknown. Threats include habitat modification, impoundments, sedimentation, eutrophication, household and agricultural runoff, recreational activities.

Environmental Baseline

On the Cherokee NF it occurs in the main channel of the Conasauga River where it was last collected in 2011. Critical Habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.20 GEORGIA PIGTOE

Habitat Relationships

The Georgia pigtoe (*Pleurobema hanleyianum*) is endemic to the Alabama River system. Preferred habitat is large streams and small rivers with low gradient at low elevation; moderate current over sand and gravel substrate. Fish host is unknown. Threats include sedimentation.

Environmental Baseline

On the Cherokee NF it occurs in the Conasauga River which may be the only extant population. Critical Habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.21 OVATE CLUBSHELL

Habitat Relationships

The ovate clubshell (*Pleurobema perovatum*) is endemic to the Mobile River system. The preferred habitat is sand/gravel shoals and runs of small rivers and large streams. Fish host is unknown. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

Environmental Baseline

The ovate clubshell has not been documented on the CNF but is known from the Conasauga River five miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.22 SLABSIDE PEARLYMUSSEL

The slabside pearlymussel (*Pleuronaia dolabelloides*) is endemic to the Tennessee River system; few extant populations are left range wide. Preferred habitat is large streams with low gradient at low elevation with moderately strong currents in sand, fine gravel, and cobble substrate. Fish hosts include: popeye, rosyface, saffron, silver, telescope, and Tennessee shiners. Threats include pollution, siltation, habitat perturbation, inundation, over-collecting, and loss of glochidial hosts.

Environmental Baseline

The slabside pearlymussel is found at two sites on the Cherokee NF in the Hiwassee River. Critical habitat includes all of the Hiwassee River from Hwy 411 to Hwy 68.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.23 TRIANGULAR (RAYED) KIDNEYSHELL

Habitat Relationships

The triangular kidneyshell (*Ptychobranhus foremanianus (foramianus)*) is endemic to Alabama River system. The preferred habitat is in medium to large rivers with a mixture of sand and gravel in moderate to swift current. Fish hosts are darters and sculpins. Threats include genetic isolation.

Environmental Baseline

On the Forest it is known to occur in the Conasauga River above Jacks River but is likely to occur all the way down stream. Critical habitat includes all of the Conasauga River on the Forest.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.24 FLUTED KIDNEYSHELL

Habitat Relationships

The fluted kidneyshell (*Ptychobranhus subtentum*) is found in the Cumberland and Tennessee River systems. Preferred habitat is small to medium rivers in areas with swift current or riffles. Fish hosts are darters and sculpins. Threats include impoundments, stream channel alterations, water pollution, and sedimentation.

Environmental Baseline

The fluted kidneyshell has not been documented on the Cherokee NF but individuals were introduced into the Hiwassee River approximately five miles downstream of the Forest boundary. Critical habitat has been designated for the Hiwassee River from Hwy 411 to Hwy 68.

Direct and Indirect Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.25 CUMBERLAND BEAN PEARLYMUSSEL

Habitat Relationships

The Cumberland bean pearlymussel (*Villosa trabalis*) is endemic to the Tennessee and Cumberland River systems; four extant populations exist. Preferred habitat for this mussel is found in large streams and small rivers with low gradient at low elevation. Current is usually fast with gravel or sand and gravel substrate. Fish host is unknown. Threats are from impoundments that flood habitat, alter flow regime, or decrease water temperature; siltation from strip mining, coal washing, dredging, farming, logging and road construction; and pollution from municipal, agricultural, and industrial waste discharges.

Environmental Baseline

It is known from two sites in the Hiwassee River on the Cherokee NF and was last collected here in 2010. Two collections were downstream of the powerhouse in the Hiwassee River – Athern in 1970 and Ortmann in 1915. Both of these are considered to be from historical populations that no longer have suitable habitat in the river.

Effects to All Aquatic Species -Direct and Indirect Effects Proposed Action

Under the Proposed Action approximately 62,000 acres of dry forest communities would be considered for management across the southern districts of the CNF. Tools that would be considered for treatment are described under the Proposed Action in section 1.2 of this document and include a number of silvicultural treatments including both mechanical and hand treatments, prescribed fire and the use of herbicides. In addition to Forest Plan standards, several assumptions have been adopted into design elements to protect threatened and endangered aquatic resources and are described in section 1.3. Any activity or project that is tiered to this analysis and falls outside these assumptions/ restrictions would be analyzed separately for additional impacts to aquatic species and habitat. The aquatic design elements extend the

riparian buffer to 300 feet on either side of streams that are occupied by threatened and endangered aquatic species, designated critical habitat, and tributaries feeding the former up to a half mile from the confluence. The extended buffer zone will be referred to from this point on as the extended buffer zone (EBZ).

Ground based mechanical equipment could be used to manage and harvest timber throughout the project area. Mechanical timber management activities including but not limited to felling, skid trails, log landings, and road construction would not be allowed in the EBZ around occupied and threatened and endangered critical habitat. The remaining stream habitat that exists in the project area would be protected by existing CNF Forest Plan standards. These systems are protected from impacts resulting from mechanical timber management activities by the Streamside Management Zone (SMZ) which is a combination of the streamside filter zone (standard FW-3) and Prescription 11 - the riparian corridor (standard RX11-13, RX11-15, and RX11-14), whichever is greater (Section 1.3, Table 3). These standards and design features were developed to protect aquatic habitat and minimize effects of mechanical vegetation management including siltation, soil compaction, loss of canopy cover (shade) leading to increased stream temperatures, and loss of large wood recruitment.

Temporary roads would be limited to 1/2 mile for each proposed management unit. After use, all temp roads would be managed following Forest Plan standards and state BMP's. (The road prism would likely remain on the landscape until such a time as site specific analysis suggests otherwise). However, design elements to protect aquatic resources would limit any road construction within the EBZ or the SMZ, and would not cross any perennial, intermittent, or ephemeral stream channels. Existing Forest Service system roads would be used to access stands and for haul routes.

No timber felling or skidding is authorized in the EBZ or SMZ, except for hand treatment of understory trees in thinning units where small understory trees would be cut and left in place. No impacts resulting from skid trails or log landings would be expected as a result of hand treatments.

Implementation of mechanical or hand vegetation treatments has a low chance of increasing sedimentation across affected watersheds. In addition, total impermeable area will not exceed 10% for any 6th level watershed (Reddington 2019). By protecting the EBZ and the SMZ, stream health is expected to be maintained in its current condition and aquatic habitat is not expected to be affected. Effects to aquatic threatened and endangered species and their habitat are not expected, and furthermore, the increased buffers are expected to eliminate any short or long term downstream effects of vegetation management where they occur. Streams and fish habitat in the project area are expected to be maintained in their existing condition in both the short and long term.

The use of prescribed fire to create and maintain desired habitat conditions, would be another management tool that may occur within dry forest communities. Forest Plan standards allow the use of riparian areas and perennial/ ephemeral stream channels as natural fire breaks but the construction of firelines are not allowed (FW-18, 19; RX11-13, 14). Additional design elements

do not allow the use of fire as a tool in the EBZ (Section 1.3). Effects from the use of prescribed fire outside of the riparian zone in dry forested communities are not expected to have measurable impacts on overall stream health of impact aquatic threatened and endangered species. Incremental amounts of sediment may enter the stream channel after dormant season burning but is not expected to be measurable. The short- and long-term an increased risk of sediment loading from prescribed fire is expected to be low at the 6th-field watershed scale (Reddington 2019)

The use of herbicides for restoration purposes would only be applied for targeted species in a targeted manner and would be in full compliance with all label restrictions and forest plan standards (FW-72 through FW-84, and FW-87). Additionally, herbicides would not be used in the EBZ. Forest plan standards (FW-15, 16) restrict the use of herbicides around the remainder of aquatic habitat in the project area. Where buffer strips are used and/or other mitigation measures are employed, herbicides used in forestry management generally do not pose a threat to water quality. The small quantity of herbicide used and the application method and strict handling standards, when combined with streamside management zones, would insure that no measurable direct or indirect effects would occur from proposed herbicide treatments in the project area (Reddington 2019). Based upon this, no effects to any aquatic sensitive species are anticipated.

Cumulative Effects

Cumulative effects were considered for aquatic habitats across the southern districts of the CNF. Past and current management actions listed in Table 1 have resulted in the current aquatic habitat conditions found across the project area. Since there are no significant negative direct or indirect effects expected as a result of the implementation of this project, there are no expected cumulative effects, above the baseline condition, associated with the proposed action. No known state or private activities are reasonably certain to occur within the action area that would affect threatened and endangered aquatic species, therefore there are no cumulative effects to analyze.

Determination of Effect: Aquatic Threatened and Endangered Species –

No effects are expected to stream habitat, aquatic T&E species or aquatic critical habitat as a result of the proposed action for the Restoration of Dry Forest Communities Project. The project is not likely to affect threatened or endangered species or their habitat for the following reasons: 1) the project does not propose ground disturbance or overstory tree removal within the EBZ and SMZ, 2) the project would not significantly increase sedimentation or total impermeable area in any watershed (Reddington 2019) and 3) mechanical vegetation management would not be allowed in the EBZ or within the SMZ. Long-term effects to aquatic sensitive species populations as a result of the proposed alternatives would not result in any measurable effect. Occupied and critical habitat would remain in its existing condition with a number of aquatic threatened and endangered species populations persisting on USFS lands. Project Design Elements including the EBZ would eliminate direct and indirect effects of timber harvest to aquatic threatened and endangered species populations across the project area. Therefore, there is “no effect” expected to aquatic threatened or endangered species, critical habitat or their occupied habitat as a result of the implementation of the Proposed Action.

4.26 SMALL WHORLED POGONIA

Habitat Relationships

Only one federally listed plant species, small whorled pogonia (*Isotria medeoloides*), has the potential to occur within dry forest communities and is considered in this analysis. Small whorled pogonia has an historic range that includes most of the eastern United States. Despite its wide geographical distribution however, it is extremely rare throughout its range. According to NatureServe (2019) this is “a widely distributed species with approximately 201 extant sites with better than poor viability known. The largest cluster of sites is centered around the Appalachian Mountains of New England and coastal Massachusetts, with two moderate-sized clusters centered around (1) the southern Appalachians and (2) the Coastal Plain and Piedmont of Virginia, Delaware, and New Jersey. There are also a few widely scattered outlying sites. Populations are typically very small and the total number of individuals is estimated to be less than 3000.”

Environmental Baseline

There are no known sites for this species on the Cherokee National Forest however the forest is within its known range. Small whorled pogonia is a difficult species to survey for due to its rather vaguely defined habitat preference and the fact that like many orchids, it does not necessarily express above-ground phenology on an annual basis. Habitat modeling developed in the northeast United States where the species has many more known occurrences suggests that occupied sites require overland vernal flows in conjunction with an impervious soil layer which leads to the seasonally high moisture content of soils (vonOettingen, pers. com. 2012). The Cherokee National Forest has been conducting botanical surveys on all areas of proposed ground disturbing activities for well over 20 years. Many thousands of acres representing all major habitat types on the forest have been inventoried, and this species has never been detected.

Direct and Indirect Effects

Silvicultural activities including both commercial and non-commercial vegetation treatments and site preparation for natural vegetation regeneration and planting, are designed to have a long-term beneficial effect on the overall composition and structure of dry forest communities, which should improve habitat for any viability concern plant species that may occur there in the long-term. Ground disturbing effects from the implementation of some of these activities could impact species populations in the short-term however. The use of mechanized equipment, felling of trees, construction of temporary roads, and creation of skid trails, all have the potential to directly impact individual plants. Changes in light conditions and other micro-site parameters (soil moisture, soil compaction, etc.) have the potential to affect local populations. Because such impacts are site specific and this proposal does not evaluate any site specific actions, no direct effects can be attributed here. As a way to ensure any potential future impacts are removed or mitigated, botanical surveys would be conducted to determine presence of this species prior to the implementation of future site specific activities. Any site found for this species would be fully protected.

The use of prescribed fire to create and maintain desired habitat conditions, is likewise intended to have a long-term beneficial effect on plant species that may occur within dry forest communities. Effects from the use of prescribed fire on threatened, endangered, sensitive, and viability concern plant species that could potentially occur within dry forest communities have been described in detail in a paper written specifically for these habitats on the Cherokee National Forest (Pistrang 2019). Based upon discussions with Geoff Call at the Cookeville Field

Office of the US Fish and Wildlife Service (Call, pers. com. 2012), dormant season prescribed burns would have no effect to this species. The lack of previous detections combined with the xeric nature of the habitats within which prescribed growing season burns would be conducted presents an extremely low likelihood that the species would be present and/or affected. Based upon this any potential impacts to the species from growing season burns would be discountable. Anecdotally, the related large whorled pogonia (*Isotria verticillata*) has been observed within a dormant season burn block, in an area where the fire burned quite hot. The plants had emerged from the recently burned duff layer and were in full bloom. Despite numerous observations of this species in vegetative form across the forest over the years, this is the only time this author has seen that species in flower on the forest, perhaps suggesting that flowering was stimulated by the fire (Pistrang 2019).

The use of herbicides for restoration purposes would only be applied for targeted species in a targeted manner and would be in full compliance with all label restrictions and forest plan standards (FW-72 through FW-84, and FW-87). Based upon this, no effects to any threatened, endangered, sensitive, and viability concern plant species are anticipated.

Cumulative Effects

No known state or private activities are reasonably certain to occur within the action area that would affect Small whorled pogonia, therefore there are no cumulative effects to analyze.

Determination of Effect: Based upon the above analysis, a finding of NO EFFECT is made for small whorled pogonia.

5.0 SUMMARY OF EFFECTS DETERMINATIONS


Table 7. Effects Determinations


Scientific Name	Common Name	Status	Determination of Effect
<i>Myotis grisescens</i>	Gray bat	E	No effect
<i>Myotis septentrionalis</i>	Northern long-eared bat	T	May affect, is likely to adversely affect
<i>Myotis sodalis</i>	Indiana bat	E	May affect, is likely to adversely affect
<i>Cyprinella caerulea</i>	Blue shiner	T	No effect
<i>Erimonax monachus</i>	Spotfin chub	T	No effect
<i>Etheostoma sitikuense</i>	Citico darter	E	No effect
<i>Etheostoma trisella</i>	Trispot Darter	T	No effect
<i>Noturus baileyi</i>	Smoky madtom	E	No effect
<i>Noturus flavipinnis</i>	Yellowfin madtom	T	No effect

<i>Percina jenkinsi</i>	Conasauga logperch	E	No effect
<i>Percina tanasi</i>	Snail darter	T	No effect
<i>Epioblasma florentina walkeri</i>	Tan (golden) riffleshell	E	No effect
<i>Epioblasma metastrata</i>	Upland combshell	E	No effect
<i>Epioblasma othcaloogensis</i>	Southern acornshell	E	No effect
<i>Hamiota altilis</i>	Fine-lined pocketbook	T	No effect
<i>Medionidus acutissimus</i>	Alabama moccasinshell	T	No effect
<i>Medionidus parvulus</i>	Coosa moccasinshell	E	No effect
<i>Pleurobema decisum</i>	Southern clubshell	E	No effect
<i>Pleurobema georgianum</i>	Southern pigtoe	E	No effect
<i>Pleurobema hanleyianum</i>	Georgia pigtoe	E	No effect
<i>Pleurobema perovatum</i>	Ovate clubshell	E	No effect
<i>Pleuroaia dolabelloides</i>	Slabside pearlymussel	E	No effect
<i>Ptychobranhus foremanianus (foramianus)</i>	Triangular (Rayed) kidneyshell	E	No effect
<i>Ptychobranhus subtentum</i>	Fluted kidneyshell	E	No effect
<i>Villosa trabalis</i>	Cumberland bean pearlymussel	E	No effect
<i>Isotria medeoloides</i>	Small whorled pogonia	T	No effect

6.0 SIGNATURE(S) OF PREPARER(S)

Prepared by:


 Mary Miller


 Mark Pistrang


 Matt Grove

7.0 DATA SOURCES AND REFERENCES

Callahan, E.V., III. 1993. Indiana bat summer habitat requirements. M.S. Thesis, University of Missouri, Columbia, Missouri.

Callahan, E.V., R.D. Drobney, and R.L. Clawson. 1997. Selection of summer roosting sites by Indiana bats (*Myotis sodalis*) in Missouri. *Journal of Mammalogy* 78:818-825.

Cherokee National Forest. TES Database Maps.

Cochran, S. M., G. W. Libby, H. D. Bryan, and J. E. Spencer. 1999. A survey for the Federally Endangered Indiana bat (*Myotis sodalis*) on the Nolichucky and Tellico Ranger Districts of the Cherokee National Forest Tennessee.

Cochran, S. M., G. W. Libby, H. D. Bryan, Macgregor, J. R., and J. E. Spencer. 2000. A survey for the Federally Endangered Indiana bat (*Myotis sodalis*) on the Nolichucky-Unaka and Tellico Ranger Districts of the Cherokee National Forest Tennessee.

Copperhead Consulting. 2009. Terrestrial Snail, Botanical, and Indiana Bat Surveys of the Middle Upper Tellico Project Area, Cherokee National Forest, Tennessee Contract Number: AG-4756-C-13-0014 Order Number: AG-4756-D-13-0012.

Etnier, D. and Starnes, W. The Fishes of Tennessee. 1993. The University of Tennessee Press. Knoxville, TN. 681 pp.

Flora of North America FNA Vol. 26 Page 512

Griffith, R. S. 1991. *Fraxinus americana*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/>

Gucker, Corey L. 2005. *Fraxinus pennsylvanica*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/tree/frapen/all.html>

Gumbert, M.W., J.M. O'Keefe, and J.R. MacGregor. 2002. Roost fidelity in Kentucky, Pp. 143-152 in A. Kurta and J. Kennedy (eds.), *The Indiana bat: biology and management of an endangered species*. Bat Conservation International, Austin, Texas.

Hammond, K.R., O'Keefe, J.M., Aldrich, S.P., & Loeb, S.C. 2016. A presence-only model of suitable roosting habitat for the endangered Indiana bat in the southern Appalachians. *PloS*

one, 11, e0154464.

- Harvey, M.J., C.S. Chaney, and M.D. McGimsey. 1991. Distribution, status, and ecology of small mammals of the Cherokee National Forest, Tennessee (Southern Districts). Report to the U.S. Forest Service Cherokee National Forest. Tenn. Tech. Univ. 65 pp.
- Harvey, M.J., J.S. Altenbach, and T.L. Best. 2011. Bats of the United States. Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service.
- Humphrey, S.R., and J.B. Cope. 1977. Survival rates of the endangered Indiana bat, *Myotis sodalis*. *Journal of Mammalogy* 58:32-36.
- Jennings, M. 2018. Letter of Threatened and Endangered Species to Consider on the CNF. USDI Fish and Wildlife Service.
- Kiser, J.D. and R.R. Kiser. 1999. A survey for the federally endangered Indiana bat (*Myotis sodalis*) on the Hiwassee, Nolichucky, Tellico, and Watauga Ranger Districts of the Cherokee National Forest, Tennessee. Eco-Tech, Inc.
- Kiser, J. 2015. Personal email communication with Mary Miller regarding capture records of the federally endangered gray bat (*Myotis grisescens*) in 2013 on the Ocoee-Hiwassee Ranger Districts of the Cherokee National Forest, Tennessee.
- LaVal, R.K., R.L. Clawson, M.L. LaVal, and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. *Journal of Mammalogy*, Vol. 58, No. 4 (Nov. 1977). Pp.592-599. Websited available: <http://www.jstor.org/stable/1380007>.
- Leftwich, C, D. Dourson, and P. Roby. 2008. Terrestrial land snail and Indiana bat surveys of Hurricane Branch, Middle Citico, and Spring Creek, Cherokee National Forest, Tennessee.
- Libby, G. W., J. E. Spencer, H. D. Bryan, P. L. Droppelman. 2004. 2003 Survey for the federally endangered Indiana bat (*Myotis sodalis*) and other rare bat species on the Nolichucky/Unaka, Ocoee-Hiwassee, Tellico, and Watauga Ranger Districts Cherokee National Forest, Tennessee. Eco-tech, Inc.
- Libby, G. W., J. E. Spencer, H. D. Bryan, P. L. Droppelman, W. K. Campbell. 2005. 2004 surveys for the federally endangered Indiana bat (*Myotis sodalis*) on the Nolichucky-Unaka and Tellico Ranger Districts of the Cherokee National Forest. Eco-tech, Inc.
- Miller, Mary. 2013. Tennessee Bat Working Group Meeting Notes, November 21, 2013.
- Moulas, C., Petsoulas, C., Rousidou K., Perruchon. C., Karas, P., Karpouzas, D.G. 2013. Effects of Systemic Pesticides Imidacloprid and Metalaxyl on the Phyllosphere of Pepper Plants. Hindawi Publishing Corporation, BioMed Research International. Volume 2013, Article ID 969750, 8 pages <http://dx.doi.org/10.1155/2013/969750>

- NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life. <http://explorer.natureserve.org/>. Version 7.1. NatureServe, Arlington, Virginia.
- NatureServe. 2016. NatureServe Explorer: An Online Encyclopedia of Life. [web application] Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org> (Accessed: May 2, 2016)
- O'Keefe, J. 2011-2012. Indiana Bat Research. Indiana State University.
- O'Keefe, J. 2011. Personal communication on Indiana bats and the use of ephemeral roost trees.
- O'Keefe, J. 2012. Personal communication on new Indiana bat maternity colonies on the Cherokee National Forest.
- O'Keefe, J.M., and Loeb, S.C. 2017. Indiana bats roost in ephemeral, fire-dependent pine snags in the southern Appalachian Mountains, USA. *Forest Ecology and Management*, 391, 264–274.
- Owen, S.F., M.A. Menzel, W.M. Ford, B.R. Chapman, K.V. Miller, J.T. Edwards and P.B. Wood. 2003. Home-range Size and Habitat used by the Northern Myotis (*Myotis septentrionalis*). *American Midland Naturalist*, 150(2):352-359.
- Pistrang, M. 2016. Botanical Surveys of Sina Branch Culvert Replacement Project Sites.
- Reddington, A. 2019. Hydrology Report: Restoration of Dry Forest Communities of the South Zone of the Cherokee National Forest. Supervisor's Office, Cherokee National Forest. Cleveland, Tennessee.
- Rojas, V.G., O'Keefe, J.M., and Loeb, S. C. 2017. Baseline capture rates and roosting habits of *Myotis septentrionalis* (northern long-eared bat) prior to white-nose syndrome detection in the southern Appalachians. *Southeastern Naturalist*, 16, 140–148.
- Rojas, V.G., O'Keefe, J.M., and Loeb, S. C. 2018. Survey of bats using capture and acoustic methods in the northern ranger districts of the Cherokee National Forest, TN. Indiana State University. 50 pages.
- Syracuse Environmental Research Associates (SERA). 2011. Glyphosate – Human Health and Ecological Risk Assessment, Final Report. SERA TR-052-22-03b. Website available: http://www.fs.fed.us/foresthealth/pesticide/pdfs/Glyphosate_SERA_TR-052-22-03b.pdf.
- Syracuse Environmental Research Associates (SERA). 2011. Imazapyr – Human Health and Ecological Risk Assessment, Final Report. SERA TR-052-29-03a. Website available: http://www.fs.fed.us/foresthealth/pesticide/pdfs/Imazapyr_TR-052-29-03a.pdf.
- Syracuse Environmental Research Associates (SERA). 2011. Triclopyr – Human Health and

Ecological Risk Assessment, Final Report. SERA TR-052-25-03a. Website available: <http://www.fs.fed.us/foresthealth/pesticide/pdfs/052-25-03aTriclopyr.pdf>.

Sewell, P, M Gumbert, P. Roby, and D. Foster. 2007. Mist net bat survey and rare species telemetry for the Cherokee National Forest, Tennessee, 2006.

Tennessee Department of Environment and Conservation. 2014. Tennessee Natural Heritage Inventory Program Records.

3-D International, Inc. 1998. Survey for the endangered Indiana bat (*Myotis sodalis*) in the Nolichucky, Unaka, and Tellico Ranger Districts of the Cherokee National Forest, Tennessee.

USDA Forest Service. 2004a. Revised Land and Resource Management Plan, Cherokee National Forest, Cleveland, TN.

USDA Forest Service. 2004b. Final Environmental Impact Statement, Revised Land and Resource Management Plan, Cherokee National Forest, Cleveland, TN.

USDA Forest Service. 2005. Forest Service Manual 2600. National Headquarters, Washington D.C., USA.

US Fish and Wildlife Service. 1982. Gray Bat Recovery Plan.

U.S. Fish and Wildlife Service. 1982. Snail Darter Recovery Plan Revised. Atlanta, Georgia. 56 pp.

U.S. Fish and Wildlife Service. 1983. Spottfin Chub Recovery Plan. Atlanta, Georgia. 46 pp.

U.S. Fish and Wildlife Service. 1983. Yellowfin Madtom Recovery Plan. Atlanta, Georgia. 61 pp.

U.S. Fish and Wildlife Service. 1984. Cumberland Bean Pearly Mussel Recovery Plan. Atlanta, Georgia. 58 pp.

U.S. Fish and Wildlife Service. 1984. Tan Riffle Shell Pearly Mussel Recovery Plan. Atlanta, Georgia. 59 pp.

U.S. Fish and Wildlife Service. 1985. Smoky Madtom Recovery Plan. Atlanta, Georgia. 28 pp.

U.S. Fish and Wildlife Service. 1986. Conasauga Logperch and Amber Darter Recovery Plan. Atlanta, Georgia. 34 pp.

U.S.USD I Fish and Wildlife Service. 1988. Endangered Species Act of 1973 as Amended through the 100th Congress.

U.S. Fish and Wildlife Service. 1993. Duskytail Darter Recovery Plan. Atlanta, Georgia. 25 pp.

- U.S. Fish and Wildlife Service. 1995. Blue Shiner Recovery Plan. Jackson, Mississippi. 20 pp.
- U.S. Fish and Wildlife Service. 1996. Appalachian Elktoe Recovery Plan. Atlanta, Georgia. 32 pp.
- U.S. Fish and Wildlife Service. 2000. Mobile River Basin Aquatic Ecosystem Recovery Plan. Atlanta, Georgia. 128 pp.
- U.S. Fish and Wildlife Service. 2004. Recovery Plan for Cumberland Elktoe, Oyster Mussel, Cumberlandian Combshell, Purple Bean, and Rough Rabbitsfoot. Atlanta, Georgia. 168 pp.
- U.S. Fish and Wildlife Service. 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision.
- U.S. Fish and Wildlife Service. 2011. Small Whorled Pogonia Factsheet. Available: https://www.fws.gov/asheville/pdfs/SmallWhorledPogonia_factsheet.pdf
- U.S. Fish and Wildlife Service. 2013. 12-Month Finding on a Petition To List the Eastern Small-footed Bat and the Northern Long-eared Bat as Endangered or Threatened Species; Listing the Northern Long-Eared Bat as an Endangered Species. Federal Register 78: 61046-61080.
- U.S. Fish and Wildlife Service. 2013. Final Rule. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Fluted Kidneyshell and Slabside Pearlymussel. Federal Register Vol. 78, No. 187: 59556-59620.
- U.S. Fish and Wildlife Service. 2014. Recovery Plan for the Georgia pigtoe mussel, Interrupted rocksnail, and Rough hornsnail. Atlanta, Georgia. 55 pp.
- U.S. Fish and Wildlife Service. 2018. Final Rule. Endangered and Threatened Wildlife and Plants; Threatened Species Status for Trispot Darter. Federal Register Vol. 83, No. 248: 67131-67140.
- U.S. Fish and Wildlife Service. 2014. Northern Long-eared Bat Interim Conference and Planning Guidance. Available: <http://www.fws.gov/midwest/endangered/mammals/nlba/index.html>
- U.S. Fish and Wildlife Service. 2015a. Programmatic Biological Opinion of the U.S. Fish and Wildlife Service for Activities Affecting Indiana Bats on the Southern Districts of the Cherokee National Forest. FWS #2014-F-0387 Issued January 22, 2015.
- U.S. Fish and Wildlife Service. 2015b. Biological Opinion of the U.S. Fish and Wildlife Service for Activities Affecting the Northern Long-Eared Bat on Southern Region National Forests. FWS Log #04E00000-2015-F-0003 Issued August 5, 2015.

Wallace, B., Ebel, R.C., Kemble, J. 2000. Imidacloprid Effects on Root Growth, Photosynthesis, and Water Use of Cucumber in the Greenhouse. *HortScience* 35 (5):953.

Whitaker Jr., J.O. and W.J. Hamilton, Jr. 1998. *Mammals of the Eastern United States*. Cornell University Press. Ithaca , NY.

Whitaker, J.O., Jr. and V. Brack, Jr. 2002. Distribution and summer ecology in Indiana. Pp. 48-54 in A. Kurta and J. Kennedy (eds.), *The Indiana bat: biology and management of an endangered species*. Bat Conservation International, Austin, Texas.

White-nose Syndrome.org. 2013. White-nose Syndrom.org: North America's Response to the Devastating Bat Disease. Available: <http://www.whitenosesyndrome.org/>

ATTACHMENT A

Proposed, Endangered and Threatened Species List Cherokee National Forest dated 4/06/2018

	Scientific Name	Common Name	Range/Watersh/Co	CNF Records	Habitat Information	TES	G-Rank
Arachnids							
1a	<i>Microhexura montivaga</i>	Spruce-fir moss spider	Mountains of NC, TN	3 TDEC records; Roan Mtn.; Carter Co.	Moss and liverwort mats on rocks/boulders in mature spruce-fir forest > 5400 ft.	E	G1
Fish							
2a	<i>Cyprinella caerulea</i>	Blue shiner	Conasauga	4 records: Conasauga River, Jack's River, Sawmill Branch & Mooneyham Branch	Large streams, small to medium-sized rivers, moderate gradient, low elevation	T	G2
2a	<i>Erimonax monachus</i>	Spotfin chub	Little Tennessee, French Broad, South Holston	2 records: Tellico River (exp), Lyons Creek (exp)	Large streams, moderate gradient, low elevation	T	G2
2a	<i>Etheostoma sitikuense</i>	Citico darter	Little Tennessee	2 records: Citico Creek, Tellico River (exp)	Large creeks & small-med rivers 10-80 m wide; moderate gradient, warm	E	G1
2a	<i>Etheostoma trisella</i>	Trispot Darter	Conasauga	No records	Small to medium sized rivers with slow velocities. Breeding habitat is smaller ephemeral streams and seeps/springs.	T	G1
2a	<i>Noturus baileyi</i>	Smoky madtom	Little Tennessee	2 records: Citico Creek, (Critical Habitat), Tellico River (exp)	Large streams, low gradient, low elevation.	E	G1
2a	<i>Noturus flavipinnis</i>	Yellowfin madtom	Little Tennessee	2 records: Citico Creek, (Critical Habitat), Tellico River (exp)	Large streams to large rivers, low gradient, low elevation	T	G1
1a	<i>Percina antesella</i>	Amber darter	Conasauga	No record. Nearest record 5 miles below forest boundary	Large streams and small rivers, low gradient, low elevation	E	G1G2
2a	<i>Percina jenkinsi</i>	Conasauga logperch	Conasauga	2 records: Conasauga River (Critical Habitat), Jack's River	Medium river, moderate gradient, low elevation	E	G1
2a	<i>Percina tanasi</i>	Snail darter	Ocoee, Hiwassee, Little Tennessee	2 records: Hiwassee River, Citico Creek	Large streams to medium rivers, low to moderate gradient, low elevation.	T	G2G3
Mammals							
1a	<i>Corynorhinus townsendii virginianus</i>	Virginia big-eared bat	Western NC, Eastern TN, southwest VA, Eastern KY, and southwest VA	6 records just off forest in NE Carter & SE Johnson Cos.	Uses caves year round; Karst regions dominated by oak-hickory, or beech-maple-forest. Bluff lines are important.	E	G3G4T2
1a	<i>Glaucomys sabrinus coloratus</i>	Carolina northern flying squirrel	Mountains of NC, TN, VA	4 TDEC records; Monroe and Carter Cos.	Mature spruce fir and adjacent northern hardwood/hemlock forests above 4000 feet; abundant snags & woody debris, fungi	E	G5T1
4a	<i>Myotis grisescens</i>	Gray bat	VA to KS south, from TN to OK; SC to FL, AL	4 TDEC records, Cocke & Greene Cos.; pvt in Carter & Sullivan Cos.	Uses caves year round; forages along riparian areas/shorelines with forest cover	E	G3
4a	<i>Myotis septentrionalis</i>	Northern long-eared bat	ME to NC; west to ND and SD; south from GA to LA; eastern MT and WY	Over 1000 mist net captures on the CNF; all CNF counties	Hibernates in caves and cave-like structures; summer maternity roosts in cavities, loose bark, crevices, or hollows of both live and dead trees;	T	G2G3
4a	<i>Myotis sodalis</i>	Indiana bat	VT to MI south, to SC, AL; IA to AR, OK	2 TDEC records; Monroe Co; addtl. ANABAT records Monroe Co and all north zone counties.	Hibernates limestone caves; maternity roosts primarily trees with loose bark; forages riparian areas and upland water holes	E	G2
Mussels							

	Scientific Name	Common Name	Range/Watersh/Co	CNF Records	Habitat Information	TES	G-Rank
1a	<i>Alasmidonta raveneliana</i>	Appalachian elktoe	Nolichucky, Pigeon, French Broad, Little Tennessee	1 record: Nolichucky River	Small to medium rivers, moderate gradient, moderate elevation	E	G1
1a	<i>Epioblasma capsaeformis</i>	Oyster mussel	Hiwassee	No record. Nearest record 5 miles below forest boundary	Large rivers, fast, shallow riffles	E	G1
2a	<i>Epioblasma florentina walkeri</i>	Tan riffleshell	Hiwassee	1 record: Hiwassee River	Small to large rivers, low gradient, low elevation	E	G1T1
2a	<i>Epioblasma metastrata</i>	Upland combshell	Conasauga	No record. Nearest record 5 miles below forest boundary. (Critical Habitat)	Large streams to medium rivers, low to moderate gradient, low elevation	E	GH
2a	<i>Epioblasma othcaloogensis</i>	Southern acornshell	Conasauga	No record. Nearest record 8 miles below forest boundary. (Critical Habitat)	Large streams to medium rivers, low to moderate gradient, low elevation	E	GHQ
2a	<i>Hamiota-altilis</i>	Finelined pocketbook	Conasauga	1 record: Conasauga River (Critical Habitat)	Large streams to medium rivers, low to moderate gradient, low elevation	T	G2
2a	<i>Medionidus acutissimus</i>	Alabama moccasinshell	Conasauga	No record. Nearest record 4 miles below forest boundary. (Critical Habitat)	Large streams, low gradient, low elevation	T	G2
2a	<i>Medionidus parvulus</i>	Coosa moccasinshell	Conasauga	No record. Nearest record 5 miles below forest boundary. (Critical Habitat)	Large streams, low gradient, low elevation	E	G1Q
2a	<i>Pleurobema decisum</i>	Southern clubshell	Conasauga	No record. Nearest record 5 miles below forest boundary. (Critical Habitat)	Large streams to medium rivers, low to moderate gradient, low elevation	E	G2
2a	<i>Pleurobema georgianum</i>	Southern pigtoe	Conasauga	1 record: Conasauga River (Critical Habitat)	Medium rivers, moderate gradient, low elevation	E	G1
2a	<i>Pleurobema hanleyianum</i>	Georgia pigtoe	Conasauga	1 record: Conasauga River (Critical Habitat)	Small streams to large rivers, moderate to high gradient, low elevation	E	G1
2a	<i>Pleurobema perovatum</i>	Ovate clubshell	Conasauga	No record. Nearest record 5 miles below forest boundary. (Critical Habitat)	Large streams, low gradient, low elevation	E	G1
2a	<i>Pleuonaia dolabelloides</i>	Slabside pearly mussel	Conasauga, Hiwassee, Nolichucky, French Broad	1 record: Hiwassee River	Large streams, low gradient, low elevation	E	G2
2a	<i>Ptychobranhus foremanianus (greenii)</i>	Rayed (Triangular) kidneyshell	Conasauga	1 record: Conasauga River (Critical Habitat)	Large streams, low gradient, low elevation	E	G1Q
2a	<i>Ptychobranhus subtentum</i>	Fluted kidneyshell	Hiwassee	No record. Nearest record 5 miles below forest boundary. (Critical Habitat)	Large streams, low gradient, low elevation	E	G1
2a	<i>Villosa trabalis</i>	Cumberland bean pearly mussel	Hiwassee, Nolichucky	1 record: Hiwassee River	Large streams and small rivers, low gradient, low elevation	E	G1
Reptiles							
1a	<i>Glyptemys muhlenbergii</i> (S. pop)	Bog turtle	MA south to GA, TN	1 TDEC record Johnson Co.; CNF record Carter Co.	Slow, shallow, mucky rivulets of sphagnum bogs, seeps, wet cow pastures, & shrub swamps	T (SA)	G3
Non-vascular Plants							
1a	<i>Gymnoderma lineare</i>	Rock gnome lichen	TN, NC, SC, GA	1 Record, Roan Mountain	High elevation rocky summits and rock outcrops.	E	G2
Vascular Plants							
1a	<i>Geum radiatum</i>	Spreading avens	Mountains of NC, TN. Sevier, Blount, Carter.	3 Records	Thin soil on rocky summits, cliffs, & ledges; open, grassy balds near <i>Rhododendron catawbiense</i> ; >4200'.	E	G1

	Scientific Name	Common Name	Range/Watersh/Co	CNF Records	Habitat Information	TES	G-Rank
1a	<i>Hedyotis purpurea</i> var. <i>montana</i>	Roan Mountain bluet	Mountains of NC, TN. Carter	1 Record	Habitat includes crevices in rock outcrops and gravelly soils at the edges of grassy balds.	E	G5T2Q
4a	<i>Isotria medeoloides</i>	Small whorled pogonia	ME to GA; Midwestern US and CAN. Washington, Hamilton.	0 Records	Open deciduous, or mixed pine-deciduous forests, often on dry to moist leaf litter.	T	G2G3
1a	<i>Pityopsis ruthii</i>	Ruth's golden aster	Southeast TN	13 Records; Polk Co.	Crevice in phyllite & graywacke boulders in historical flood zone Ocoee & Hiwassee Rivers.	E	G1
1a	<i>Platanthera integrilabia</i>	White fringeless orchid	VA to GA, KY to AL, MS. Polk, Monroe and several Cumberland Plateau counties	2 Records	Forested wetlands (Cumberland forest acid seep) and wet utility ROW's	T	G2G3
1a	<i>Solidago spithamea</i>	Blue Ridge goldenrod	Mountains of NC, TN. Carter Co, Roan Mtn.	1 Record	Rocky places (outcrops, ledges, cliffs, balds) above 4500 ft.	T	G1
1a	<i>Spiraea virginiana</i>	Virginia spiraea	AL, GA, KY, LA, NC, OH, PA, TN, VA, WV	0 Records. Previous record no longer extant; Unicoi Co., Nolichucky River	Riverbanks and riverside shrub thickets; rocky areas susceptible to flood scour. Riparian dependent.	T	G2

*PRC = Project Review Code; to get the appropriate code for each species use the Project Review Code Key.

* Co. = Counties from which the species is currently known. Does not represent potential occurrence. Counties of occurrence for vascular plants obtained from University of TN Plant Atlas, online version, 4/04.

*Forest Occurrence Data is based upon currently known records. It is NOT necessarily reflective of potential occurrence, especially for plants.

*Habitat Information is only a summary. For a more thorough discussion on species, refer to the individual species write-ups that have been provided. For streams the following definitions apply:

Orders

small 3, 4
medium 5, 6, 7
large 8, 9

Gradients

low <=2%
moderate >2% - <=4%
high >4%

Elevations

low <=1200'
high >1200'

ATTACHMENT B

List for determining the Project Review Code (PRC) for each PET Species

1a = The project is located out of the species known range, or suitable habitat does not exist in the project area. Determination of Effect: PET – No Effect

2a = All requisite habitat has been identified and excluded from disturbance associated with the project. Therefore, the project is expected to have no effects regardless of the number and location of individuals in the area affected by the project. Determination of Effect: PET – No Effect

3a = The project is being implemented for the benefit of the species, and is expected to have totally beneficial effects regardless of the number and location of individuals in the area affected by the project. Determination of Effect: T&E – May affect, not likely to adversely affect

4a = It is assumed that the species is present. Additional information on the number and location of individuals is not needed to improve the design and/or application of mitigation to reduce adverse effects, or to allow a better assessment of effects to viability of the population.

5a = The species is already covered by a current site-specific inventory for the project area and additional inventories are not needed.

6a = Inventory methods are not technically or biologically feasible and effective for providing substantial information on the number and location of individuals. It is assumed that the species is present.

7a = A site-specific inventory was conducted, but the species was not found in the project area. Determination of Effect: PET– No Effect

7b = A site-specific inventory was conducted, and the species was found in the project area.